

**Hillsdale Lake
2000 Water Quality Report**

1. General.

a. **Project location.** Hillsdale Lake is located at river mile 18.2 on Big Bull Creek, a tributary of the Marais des Cygnes River. The project watershed consists of 144 square miles (92,160 acres) in the rapidly growing Johnson, Miami, Franklin, and Douglas counties of east central Kansas. The project is approximately 5 miles northwest of Paola, Kansas.

b. **Authorized project purposes.** Flood control, water supply, recreation, fish and wildlife, and water quality control are the authorized purposes of the project completed in 1982.

c. **Pertinent data.**

Pools	Surface Elevation (ft. above m.s.l.)	Current Capacity (1,000 A.F.)	Surface Area (acres)	Shoreline (miles)
Flood Control	931.0	83.6	7,410	
Multipurpose	917.0	74.3	4,580	51
Inactive		9.0*		
Total	157.9			

Total Drainage Area: 144 sq. miles

Average Annual Inflow: 94,241 acre-feet

* Contained in multipurpose pool.

2. Activities and studies of the year.

The Water Quality Unit (PM-PR-W) continued its participation in the multi-agency, cooperative water quality study of the Big Bull Creek watershed in 2000. Other agencies involved in the long-term study include the Johnson County Environmental Department (JCED), the Environmental Protection Agency (EPA), the United States Geological Survey (USGS), the Consolidated Farm Services Agency (CFS), the Natural Resources Conservation Service (NRCS), the Kansas Department of Wildlife and Parks (KDWP), and the Kansas Department of Health and Environment (KDHE). A citizens group, the Lake Region Resource Conservation and Development Council, Inc. (RC&D), is also a major participant in the long-term study begun in 1993. The organizations have entered into a cooperative agreement to develop and carry out a watershed protection plan for Hillsdale Lake. The plan addresses the effects of nutrient,

sediment, and pesticide loading on water quality and water uses in the reservoir, which is now experiencing accelerated eutrophication. The objectives include implementation of non-point source pollution control measures in the watershed, closer evaluation of point-source discharges, implementation of the best available technology to improve water quality conditions in the tributary streams, and, ultimately, maintenance of the existing trophic state of the reservoir. To date, more than \$1 million has been spent on pollution control practices (Creation of buffers or vegetative filter strips on cropland and planting of water willows on the lake shoreline were major undertakings in 2000). The NRCS's Environmental Quality Incentive Program annually provides more than \$80,000 for cost-sharing to implement the practices. As a result, there has been a 17% reduction in sediment entering the lake. It is estimated that a 30 % reduction will be required to achieve in-lake water quality goals of 0.04 mg/L total phosphorus and 12 ug/L chlorophyll a. To further meet the water quality goals, studies were initiated in 1999 to establish an in-lake water clarity (secchi depth) criterion and to develop strategies for allocation of the Total Maximum Daily Load (TMDL) for phosphorus between nonpoint and point sources.

The most significant funding of the watershed study to date is by the EPA Section 319 Nonpoint Source Pollution Control Grant (C9007405-98) Program of the Clean Water Act administered by KDHE. The remaining funding and services are being provided by the cooperating organizations. In 2000, PM-PR-W performed monthly reservoir sampling and certain associated analytical work. The unit also funded analytical costs of \$4,220 not covered by the Section 319 Grant. Additionally, incorporation of the Hillsdale Water Quality Project (HWQP) and the establishment of tax-exempt status in 1998 have provided a means of sustaining long-term funding through private and corporate tax-deductible contributions.

The PM-PR-W field work included profiling of temperature, DO, conductivity, oxidation reduction potential or redox, and pH; measurement of photic zone and secchi depth; and collection, pretreatment, and delivery of depth integrated photic zone and sub surface water samples. The unit performed analyses for chlorophyll a, turbidity, and suspended solids in its mobile and wet laboratories.

The JCED and USGS have the major responsibilities of establishing and monitoring the stream stations. The JCED is the lead laboratory in both the reservoir and stream analytical work. The JCED laboratory performed ammonia (NH₃), nitrite (NO₂), nitrate (NO₃), and total kjeldahl nitrogen (TKN); total phosphorus (TP); dissolved orthophosphorus (DOP); fecal coliform (FC); and atrazine (ATZ) analyses. Other laboratories participating include the USGS, CMQA, and EPA.

3. Existing Conditions.

a. **Inflow.** The HWQP sampled four tributaries in 2000; the streams and number of samples were as follows: Big and Little Bull creeks, 24 and 29, respectively; Wade Branch, 8; and Rock Creek, 7. As in past years, total nitrogen (TN) levels, which are the sum of NH₃, NO₂, NO₃, and TKN concentrations, exceeded the in-stream eutrophy criterion of 1.2 mg/L during almost all survey periods (Table 1). Highest concentrations continue to be present in the larger streams with higher runoff and both point and nonpoint source contributions. Big Bull Creek at I-35

(HD-18) and Little Bull Creek at 207th Street (HD-22) had mean annual TN concentrations of 5.63 mg/L and 3.23 mg/L, respectively. The means are almost identical to those present in 1999. The maximum TN concentration detected in 2000 stream surveys was 10.53 mg/L in the Big Bull Creek (HD-18) on February 18. The smaller streams with lower runoff and no point-source contributions had mean annual TN concentrations of 0.49 mg/L (Wade) and 1.13 mg/L (Rock).

Similarly, total phosphorus (TP) concentrations in the two larger streams exceeded the established in-stream criterion of 0.1 mg/L during most survey periods. The mean annual TP concentrations were 1.41 mg/L and 0.44 mg/L in Big and Little Bull creeks, respectively. The smaller streams had mean annual TP concentrations ranging from 0.08-0.14mg/L. The excessive nutrient levels have been present throughout the 8-year study period and clearly demonstrate that the Big Bull Creek is the most important source of nutrients to the lake. In past comparisons of the closest stations downstream of the existing point sources with the more downstream stations on both Big and Little Bull creeks, the data clearly demonstrated the impact of the sewage treatment plant (STP) effluent on water quality. The upper stations exhibited substantially higher concentrations of nutrients, particularly in the winter months when, presumably, the effluent discharges from the STPs comprised a greater percentage of the base stream flows (i.e., there was minimal dilution of the effluent discharges).

The algal response to the eutrophic nutrient levels was not measured in 2000; however, past data show the hypereutrophic levels exist despite the continuing high turbidity and suspended solids within the inflow streams. Big Bull Creek exhibited mean and maximum chlorophyll a concentrations in 1996 of 15.2 ug/L and 87.6 ug/L, respectively. Similarly, Little Bull Creek had mean and maximum chlorophyll A concentrations of 14.3 ug/L and 68.8 ug/L, respectively.

Atrazine concentrations in the inflow streams in 2000 continued to exhibit seasonal highs in the late spring/early summer periods (May and June) in association with post-application, runoff events. The maximum observed concentration in Big Bull Creek was 27.10 ug/L in a May 26-27 composite sample. During the remainder of the year, the herbicide levels were substantially lower and did not pose a significant water supply concern. Mean atrazine concentrations for April-August 2000 were Big and Little Bull creeks, 5.20 ug/L and 2.98 ug/L, respectively; Rock Creek, 3.36 ug/L; and Wade Branch, 4.63 ug/L. The long-term mean concentrations for all tributaries have not exceeded the EPA Maximum Contaminant Level for drinking water supplies (MCL) of 3 ug/L. In a majority of the streams, however, there was a continuing exceedence of the EPA criterion for the protection of aquatic life of 1 ug/L.

b. **Lake.** Hillsdale Lake exhibited a fairly normal seasonal thermal regime during 2000. The forebay (down lake) area of the impoundment, represented by station HD-3, developed limited stratification in April (Table 2). During May the down lake area continued to be well oxygenated throughout the 12-meter water column. The onset of more intense stratification was noted in June when DO concentrations in the deepest portions of the water column dropped below 1 mg/L. The lake was intensely stratified by mid July with a maximum thermal differential of 5.8 °C between surface and bottom waters. The intensely stratified reservoir exhibited essentially anaerobic conditions in the lower half of the 13-meter water column. By mid-August there was some improvement in DO concentrations in the hypolimnion (only the

lower third of the 12.5-meter water column was anaerobic). Within the epilimnion, however, DO concentrations were depressed with the upper 7 meters having only 5.3 mg/L. By mid September, destratification had already occurred, and the down lake area was again fairly well oxygenated throughout the water column. Historically, thermal stratification breaks down in mid to late September, and satisfactory DO concentrations redevelop throughout the water column. Steadily dropping water temperatures and increasing DO concentrations throughout the water column characterize the totally mixed forebay during the remainder of the year.

The middle portions of the Big Bull arm (HD-6) and the Little Bull arm (HD-11) exhibited the same seasonal onset of stratification, but developed their maximum temperature differential between surface and bottom waters more quickly. Unlike the down lake area, the shallower, middle sections of the reservoir did not continue to be as strongly stratified during the remainder of the summer. Temperature differentials of 0.4 to 2.8 °C were present through July. By August the arms were essentially isothermal. Epilimnetic dissolved oxygen concentrations paralleled those down lake. Anoxic conditions in the hypolimnion existed only in July. By August the entire water column was again aerobic. Destratification typically occurs two weeks earlier in the arms than in the forebay, but in 2000, limited stratification still was present in the arms in September. Surface DO concentrations were, however, much improved (greater than 8 mg/L). Typically during this period, surface dissolved oxygen concentrations fall well below saturation as mixing occurs throughout the water column. And, as observed in 2000, oxygen conditions recover more quickly in the middle sections. The reoxygenation process is complete throughout the entire lake by late September.

Elevated nutrient levels were again present in the impoundment in 2000 (Table 3). The lake's mean total phosphorus (TP) concentration in surface waters was 0.05 mg/L. In 1998 and 1999, the lake mean was 0.06 mg/L. As in previous years, the criterion of a maximum of 0.04 mg/L TP in the surface waters was met in the forebay (0.04 mg/L) but not in the arms. Total phosphorus concentrations were again highest in the Big Bull arm with a mean concentration of 0.07 mg/L for the 2000 survey period. The surface waters of the Little Bull arm had a 2000 mean TP concentration of 0.05 mg/L.

The calculated total nitrogen (TN) concentrations comprised of NH₃, NO₂, NO₃, and TKN were substantially lower than those present in past years, presumably because of the low inflow conditions present during the 2000 survey period. However, as in past years, highest TN concentrations were exhibited in the spring runoff period and in bottom waters where availability for algal uptake is limited. Mean 2000 TN concentrations in the surface waters of the forebay, Little Bull, and Big Bull arms were 0.50 mg/L, 0.45 mg/L, and 0.52 mg/L, respectively, which indicate moderately enriched conditions throughout the lake.

Water clarity generally increased from spring lows to mid summer highs. The down lake area exhibited the highest water clarity with mean and maximum photic zone depths of 2.32 m and 3.26 m, respectively, in 2000. The Big Bull arm exhibited the lowest water clarity with mean and maximum photic zone depths of 1.33 m and 1.58 m, respectively. The Little Bull arm clarity lay in between with mean and maximum photic zone depths of 1.79 m and 2.62 m, respectively. The mean turbidity and suspended solids associated with the above water clarities

were as follows: down lake, 9.3 NTU and 5.7 mg/L; Big Bull arm, 18 NTU and 17 mg/L; and Little Bull arm, 11 NTU and 10 mg/L, respectively. These mean annual values reflect clear to moderately clear conditions in the down lake and arms, respectively, following slightly elevated turbidities in the early season runoff period.

Algal productivity under the above conditions was only moderately high, and well below the eutrophy criterion established for Hillsdale Lake (a mean growing season chlorophyll concentration not to exceed 12 ug/L). Chlorophyll concentrations ranged from mesotrophic during high turbidity periods to eutrophic during low turbidity periods. The mean and maximum chlorophyll concentrations were forebay, 3.6 ug/L and 7.8 ug/L; Big Bull arm, 7.9 ug/L and 13.6 ug/L; and Little Bull arm, 3.7 ug/L and 8.6 ug/l, respectively. Combining the values for all stations produced a 2000 mean growing-season chlorophyll concentration of 5.1 ug/L, which is substantially lower than the 1999 lake mean (10.2 ug/L).

The 2000 herbicide levels continued to fall below the established criterion. Atrazine was detected throughout the survey period, however, unlike past years, there were no exceedences of the 3 ug/L Maximum Contaminant Level (MCL) for drinking water supplies. The mean and maximum surface concentrations for the forebay, Little Bull and Big Bull arms were 1.30 ug/L and 1.44 ug/L; 1.30 ug/L and 1.46 ug/L; and 1.17 ug/L and 1.82 ug/L, respectively. The lower levels probably are attributable to the hydrologic conditions in 2000, (i.e., lack of significant storm runoff in the immediate post application period) and to the increased use of best management practices on cropland within the watershed.

c. **Outflow.** Ambient conditions in the outlet during 2000 sampling periods were very satisfactory, continuing the trend observed throughout the period of record. The DO concentrations were at or above saturation as a result of reaeration within the dam's tower and were well above the state standard (a minimum of 5 mg/L). Temperature, pH, conductivity, and redox fell within acceptable ranges at all times. Turbidity levels were moderately low with mean and maximum of 11 NTU and 17 NTU, respectively (Table 4). Suspended solids were also moderately low (mean and maximum of 8.8 mg/L and 13 mg/L, respectively). The 2000 mean TN concentration (0.48 mg/L) was substantially lower than the stream eutrophy criterion of 1.20 mg/L. Ammonia was not detected in 2000 sampling, and, as a result, there were no exceedences of the chronic criterion for a warm water fishery. Nitrite concentrations were below the detection limit during most periods. Nitrate concentrations (mean and maximum of 0.13 mg/L and 0.31 mg/L, respectively) were very acceptable for drinking water supplies. Total phosphorus concentrations (mean and maximum of 0.03 mg/L and 0.05 mg/L, respectively) fell well below the in-stream eutrophy criterion of 0.10 mg/L. Atrazine concentrations continued to fall below the MCL for drinking water supplies with a mean and maximum of 1.13 ug/L and 1.48 ug/L, respectively, during 2000. However, these concentrations do represent an almost continuous exceedence of the criterion for the protection of aquatic life in the stream (1 ug/L).

4. Future conditions.

The overall water quality of Hillsdale Lake is satisfactory as evidenced by the continued good sport fishery. The extremely high suspended solids load entering the lake during storm

events will ultimately cause excessive sedimentation in the upper portion of the pool, sharply reducing its size and flood storage capacity. The associated turbidity in the headwaters adversely affects the sport fishery and, therefore, the recreation benefits of the project. Eutrophic conditions in the inflow streams, which are attributable to point- and non-point source pollution, will ultimately impact the headwaters of the impoundment resulting in oxygen depletion problems, algal blooms, and fish kills. A HWQP report published in 2000 concluded that total phosphorus loading had not changed significantly in the period 1994-1999. And, therefore, lake nutrient levels can be expected to remain in eutrophic ranges until non-point source pollution control practices have been implemented on additional acreage within the watershed and point-source contributions are diverted or reduced. Pesticide surveys continue to show heavy herbicide loading in the streams in association with the spring and early summer storm runoff. And while atrazine levels in the lake have generally fallen below the MCL for drinking water supplies, they are still a concern, since many rural water district treatment plants will be required to use more costly activated carbon filtration to significantly reduce herbicide concentrations in their finished water. (Rural Water District No.2 in Miami County completed upgrades to its treatment system in 1999 at a cost of \$3.3 million.) Finally, atrazine concentrations in the discharge will continue to be a concern until levels fall below the EPA criterion for the protection of aquatic life (1 ug/L).

5. Recommendations .

The District should continue to strongly support the cooperative, water quality monitoring and abatement program for the lake and the Big Bull watershed. The ultimate goal of the watershed protection program is to reduce the sediment and nutrient loading from the point and nonpoint sources to the Big and Little Bull Creeks. Continued support of the Osage River Basin modeling study should ultimately help to predict long-term, water quality conditions and to establish lake-specific, water quality criteria which will protect the aquatic ecosystems of each of the six Osage River Basin reservoirs.

Appendix
Tables 1-4.

Table 1. 1999-2000 Water Quality Data for Big Bull Creek Watershed Streams

STAT DET REP		DEPTH	DATE	TKN	NH3	NO3-N	NO2-N	TN	TP	DOP	ATZ	TSS	FC
UNITS		m	mmddyy	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	/100ml
HD-18	B.Bull I-35	0.1	1/14/99	6.07	5.22	3.84		15.10	1.21	1.12		6	20
HD-18		0.1	2/17/99	0.89	0.19	3.24		4.32	0.39	0.28		24	140
HD-18		0.1	3/8,9/99	3.67	0.70	3.97		8.34	0.66	0.27		356	
HD-18		0.1	4/1/99	0.87		2.30		3.17	0.42	0.26	<0.1	28	
HD-18		0.1	4/14/99	1.37		2.20		3.57	0.56	0.34	0.20	53	
HD-18		0.1	4/14,15/99	3.50				3.50	0.75	0.23		608	
HD-18		0.1	4/16/99								32.00		
HD-18		0.1	4/21/99								11.00		
HD-18		0.1	4/22,23/99	5.39		3.50		8.89	1.23	0.18		1555	
HD-18		0.1	4/23/99								15.00		
HD-18		0.1	4/26/99	2.65		3.50		6.15	0.68	0.18		698	
HD-18		0.1	5/4,5/99	3.34		1.70		5.04	0.83	0.18		984	
HD-18		0.1	5/13/99	0.78		3.10		3.88	0.40	0.26		50	
HD-18		0.1	5/17,18/99	3.43		3.40		6.83	0.80	0.16		768	
HD-18		0.1	5/27/99	1.47		2.90		4.37	0.49	0.26		90	
HD-18		0.1	6/28,29/99	5.75		2.00		7.75	1.49	0.20		1983	
HD-18		0.1	6/8/99	1.48				1.48	0.64	0.37	4.00	43	
HD-18		0.1	6/17/99								4.00		
HD-18		0.1	6/23/99	1.20		3.70		4.90	0.67	0.52		59	
HD-18		0.1	6/24/99								3.70		
HD-18		0.1	6/29/99								4.20		
HD-18		0.1	7/7/99	1.55		2.80		4.35	0.59	0.35		65	
HD-18		0.1	7/9/99								3.00		
HD-18		0.1	7/9,10/99	5.15		1.80		6.95	1.32			1545	
HD-18		0.1	7/15/99								1.40		
HD-18		0.1	7/21/99	1.30		4.00		5.30	0.50	0.37	1.30	36	
HD-18		0.1	7/28/99								1.10		
HD-18		0.1	8/6/99								1.10		
HD-18		0.1	8/30/99	1.96		3.60		5.56	1.10	0.93		41	
HD-18		0.1	9/7,8/99	3.47		1.40		4.87	1.37	0.59		908	
HD-18		0.1	9/12/99	3.23		1.40		4.63	1.12	0.39		733	
HD-18		0.1	9/27,28/99	2.46		0.90		3.36	0.83	0.42		508	
HD-18		0.1	10/8/99	0.93		2.20		3.13	0.47	0.32		33	

STAT DET		DEPTH	DATE	TKN	NH3	NO3-N	NO2-N	TN	TP	DOP	ATZ	TSS	FC
REP UNITS		m	mmddyy	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	/100ml
HD-18		0.1	2/7/00	5.04		4.00	0.07	9.11	2.19	2.03		7	
HD-18		0.1	2/18/00	5.98		4.46	0.09	10.53	1.42			423	
HD-18	B Bull I-35	0.1	2/28/00	4.49		1.96	0.10	6.55	0.88			318	
HD-18		0.1	3/15-16/00	3.95		lip	0.10	4.05	0.71	0.36		302	
HD-18		0.1	3/23-24/00	4.31		2.97	0.07	7.35	0.88			598	
HD-18		0.1	4/17/00	1.83		1.17	0.05	3.05	0.88	0.39	0.37	43	
HD-18		0.1	5/11/00	4.47		0.50	0.18	5.15	1.73	1.15	0.61	52	
HD-18		0.1	5/24/00	5.77		0.35	0.26	6.38	1.52	0.51	0.67	26	
HD-18		0.1	5/26-27/00	4.52				4.52	1.42		27.10	1250	
HD-18		0.1	6/1/00								13.30		
HD-18		0.1	6/8/00	1.88		lip	lip		0.85	0.64	6.17	44	
HD-18		0.1	6/14/00	3.27		4.40	0.16	7.83	1.10	0.46	3.50	653	
HD-18		0.1	6/20-21/00	2.92		0.97	0.04	3.93	0.98	0.19	2.05	863	
HD-18		0.1	6/29/00	1.02		1.02	0.13	2.17	0.61	0.41	2.13	52	
HD-18		0.1	7/11/00	1.50		0.25	0.03	1.78	0.79	0.60		33	
HD-18		0.1	7/26/00	1.61		2.60	0.11	4.32	1.18	0.89		42	
HD-18		0.1	8/9/00	1.12		1.83	<0.02	2.95	1.16	1.03	0.65	25	
HD-18		0.1	8/30/00	1.48		2.08	0.04	3.60	1.42	1.24	0.63	39	
HD-18		0.1	9/21/00	2.03		1.07	<0.02	3.10	2.18	2.00		46	
HD-18		0.1	10/10/00	5.40		3.90	0.16	9.46	4.41	4.05		16	
HD-18		0.1	10/23/00	2.80		2.20	0.09	5.09	1.41	0.55		275	
HD-18		0.1	10/31/00	1.17		8.20	0.09	9.46	1.81	1.60		15	
HD-18		0.1	11/6-7/00	2.08		2.00	0.05	4.13	1.21	0.40		438	
HD-18		0.1	11/20/00	4.79		4.60	0.06	9.45	1.67	1.26		6	
HD-19	Rock Ck	0.1	1/14/99	0.30	0.16	1.26		1.72	0.04	0.02		3	30
HD-19		0.1	2/9/99	0.35	<0.1	1.34		1.69	0.07	0.02		16	320
HD-19		0.1	3/8/99	0.92	<0.1	0.50		1.42	0.15	0.01			160
HD-19		0.1	4/1/99	0.47		0.40		0.87	0.05	<0.01	<0.1		10
HD-19		0.1	4/14/99								<0.1		
HD-19		0.1	5/3/99	0.61		1.90		2.51	0.11	0.04			20
HD-19		0.1	5/13/99	0.51		1.50		2.01	0.10	0.03			21
HD-19		0.1	5/27/99	0.99		1.70		2.69	0.19	0.06			35
HD-19		0.1	6/8/99								2.30		
HD-19		0.1	6/14/99	0.79		1.00		1.79	0.10	0.09			23

STAT		DEPTH	DATE	TKN	NH3	NO3-N	NO2-N	TN	TP	DOP	ATZ	TSS	FC
DET		m	mmddyy	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	/100ml
HD-19		0.1	6/23/99		0.20	0.10	0.30	0.02		0.01	0.01	0.10	
HD-19		0.1	7/7/99	0.59		1.30		1.89	0.17	0.05		14	
HD-19	Rock Ck	0.1	7/21/99			0.40		1.11	0.09	0.03		1.40	
HD-19		0.1	7/28/99	0.71		0.40		1.42	0.20	0.13		19	
HD-19		0.1	10/8/99	0.72		0.70						11	
HD-19		0.1	4/17/00	0.28		0.18	<0.02	0.46	0.04	0.01	0.15	7	
HD-19		0.1	5/11/00								8.38		
HD-19		0.1	5/24/00								3.39		
HD-19		0.1	6/1/00	0.95		1.31	0.04	2.30	0.22	0.07		40	
HD-19		0.1	6/8/00								4.14		
HD-19		0.1	6/29/00								0.75		
HD-19		0.1	7/11/00	0.58		0.06	<0.02	0.64	0.16	0.05		10	
HD-21	Wade Br	0.1	1/14/99	0.15	0.15	1.04		1.34	0.03	0.02		2	130
HD-21		0.1	2/9/99	0.89	<0.1	1.60		2.49	0.15	0.05		32	145
HD-21		0.1	3/8/99	5.64	0.90	3.32		9.86	0.88	0.31			3270
HD-21		0.1	4/1/99	0.22		0.40		0.62	0.03	<0.01	<0.1		3
HD-21		0.1	4/14/99								0.20		
HD-21		0.1	4/21/99								<0.1		
HD-21		0.1	5/3/99	0.24		1.60		1.84	0.05	0.03		5	
HD-21		0.1	5/13/99	0.44		1.20		1.64	0.04	0.03		7	
HD-21		0.1	5/27/99	0.31		1.50		1.81	0.07	0.04		6	
HD-21		0.1	6/8/99								1.30		
HD-21		0.1	6/14/99	0.25		1.00		1.25	0.05	0.03		9	
HD-21		0.1	6/17/99								0.60		
HD-21		0.1	6/24/99								0.60		
HD-21		0.1	7/7/99	0.21		1.00		1.21	0.06	0.05		2	
HD-21		0.1	7/15/99								0.20		
HD-21		0.1	7/28/99	0.33		0.30		0.63	0.13	0.03	0.20	7	
HD-21		0.1	10/8/99	0.28		0.60		0.88	0.10	0.06		4	
HD-21		0.1	4/17/00	0.18		0.09	<0.02	0.27	0.05	0.02	0.06	8	
HD-21		0.1	5/11/00								13.70		
HD-21		0.1	5/24/00								3.76		

STAT	DEPTH	DATE	TKN	NH3	NO3-N	NO2-N	TN	TP	DOP	ATZ	TSS	FC
DET			0.20	0.10	0.30	0.02		0.01	0.01	0.10		
REP			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	/100ml
UNITS	m	mmddyy										
HD-21	0.1	6/1/00	0.49		0.47	0.07	1.03	0.12	0.05	5.30	21	
HD-21	0.1	6/1/00	0.49		0.47	0.07	1.03	0.12	0.05	5.30	21	
HD-21	0.1	6/8/00								4.65		
HD-21	0.1	6/29/00								0.33		
HD-21	Wade Br	0.1	7/11/00	0.30		0.10	<0.02	0.40	0.10	0.04	5	
HD-21		0.1	10/19/00	0.26		<0.1	<0.02	0.26	0.07	0.02	5	
HD-22	L. Bull 207	0.1	2/9/99	0.51	<0.1	1.98		2.49	0.11	0.04	26	120
HD-22		0.1	03/8,9/99	3.48	0.20	1.73		5.41	0.70	0.07	980	
HD-22		0.1	4/1/99	0.61		1.40		2.01	0.05	<0.01	<0.1	6
HD-22		0.1	4/14/99	1.49		1.90		3.39	0.22	0.06	45	
HD-22		0.1	4/14,15/99	2.96				2.96	0.70	0.11	960	
HD-22		0.1	4/16/99							10.00		
HD-22		0.1	4/22,23/99	4.38		2.60		6.98	1.13	0.07	1828	
HD-22		0.1	4/23/99							3.30		
HD-22		0.1	4/26/99	2.76		2.50		5.26	0.67	0.06	1117	
HD-22		0.1	05/4,5/99	2.45		1.80		4.25	0.76	0.09	1368	
HD-22		0.1	5/13/99	0.43		2.70		3.13	0.08	0.06	23	
HD-22		0.1	5/17,18/99	3.92		3.30		7.22	0.85	0.06	1365	
HD-22		0.1	5/27/99	0.67		1.80		2.47	0.21	0.04	34	
HD-22		0.1	6/8/99	0.87				0.87	0.18	0.07	56	
HD-22		0.1	6/14/99							2.20		
HD-22		0.1	6/23/99	0.66		1.80		2.46	0.23	0.06	37	
HD-22		0.1	6/28,29,99	5.00		2.70		7.70	1.18	0.11	1990	
HD-22		0.1	6/29/99							2.50		
HD-22		0.1	7/7/99	0.71		2.00		2.71	0.14	0.04	46	
HD-22		0.1	7/9/99							0.90		
HD-22		0.1	7/9,10/99	3.45		2.20		5.65	0.90		1230	
HD-22		0.1	7/21/99	1.08		4.10		5.18	0.09	0.06	16	
HD-22		0.1	7/28/99							0.70		
HD-22		0.1	8/30/99	0.88		1.40		2.28	0.19	0.06	27	
HD-22		0.1	09/7,8/99	3.50		0.80		4.30	0.82	0.07	1040	
HD-22		0.1	9/12/99	3.26		0.90		4.16	0.70	0.07	868	
HD-22		0.1	10/8/99	0.61		0.90		1.51	0.13	0.07	12	

STAT DET	DEPTH	DATE	TKN	NH3	NO3-N	NO2-N	TN	TP	DOP	ATZ	TSS	FC
REP UNITS	m	mmddyy	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	mg/L	/100ml
HD-22	0.1	2/7/00	1.14		2.70	0.03	5.38	0.33	0.14		6	
HD-22	0.1	2/18/00	3.73		1.87	0.03	5.63	0.09			1050	
HD-22	0.1	2/28/00	2.34		0.64	0.04	3.02	0.45			338	
HD-22	0.1	3/15-16/00	2.78		lip	0.03	2.81	0.63	0.01		553	
HD-22	0.1	3/23-24/00	3.22		1.56	0.03	4.81	0.71			800	
HD-22	L Bull 207	0.1	4/17/00	0.50		0.81	<0.02	1.31	0.05	0.01	<0.02	6
HD-22		0.1	5/24/00	0.73		0.92	0.24	1.89	0.14	0.05	0.36	30
HD-22		0.1	5/26-27/00	4.54				4.54	0.94		15.30	1290
HD-22		0.1	6/8/00	0.98		lip	lip		0.14	0.06		34
HD-22		0.1	6/14/00	2.79		2.34	0.02	5.15	0.70	0.10	0.66	904
HD-22		0.1	6/20-21/00	4.55		1.29	0.02	5.86	1.31	0.09	2.43	2050
HD-22		0.1	6/29/00	1.19		1.12	<0.02	2.31	0.21	0.05	1.91	27
HD-22		0.1	7/3/00	3.49		1.27	0.03	4.79	0.98	0.09		1485
HD-22		0.1	7/11/00	1.10		0.30	<0.02	1.40	0.18	0.04		34
HD-22		0.1	7/26/00	0.57		0.19	<0.02	0.76	0.15	0.06		28
HD-22		0.1	8/9/00	0.82		0.37	<0.02	1.19	0.13	0.05	0.23	25
HD-22		0.1	8/30/00	0.97		0.18	<0.02	1.15	0.16	0.09		13
HD-22		0.1	9/21/00	0.71		0.07	0.06	0.84	0.13	0.04		24
HD-22		0.1	10/10/00	0.94		0.60	<0.02	1.54	0.22	0.17		24
HD-22		0.1	10/23/00	4.28		0.94	<0.02	5.22	1.02	0.11		1393
HD-22		0.1	11/6-7/00	2.64		1.20	<0.02	3.84	0.79	0.15		684
HD-22		0.1	11/20/00	0.72		3.60	0.02	4.34	0.17	0.12		6
HD-23	B. Bull 191	0.1	1/14/99	21.43	17.92	3.37		42.72	3.35	3.16		6
HD-23		0.1	2/17/99	2.55	2.11	8.19		12.85	1.30	1.22		6
HD-24	L. Bull 183	0.1	2/9/99	1.53	0.48	3.87		5.88	0.34	0.20		23
	L. Bull 201	0.1	5/11/00	0.87		0.55	0.05	1.47	0.15	0.05	0.58	38
	L. Bull 223	0.1	4/17/00	1.00		0.58	0.02	1.60	0.13	0.01	0.11	48
		0.1	5/11/00	0.96		0.21	0.03	1.20	0.14	0.03	0.30	29
		0.1	6/8/00	1.88		lip	lip	1.88	0.11	0.02	4.14	18
		0.1	7/11/00	1.40		0.05	0.02	1.47	0.24	0.02		22
		0.1	8/9/00	1.00		0.12	<0.02	1.12	0.16	0.04	0.30	26
		0.1	9/21/00	1.21		0.07	<0.02	1.28	0.13	0.03		28

Table 2. 2000 Hillsdale Lake Ambient Profiles

Station	Date mm/dd/yy	Time hhmm	Depth m	Temp °C	D.O. mg/L	Spec. Cond. u ohms	pH	Orp. mV
HD-2	4/24/00	1300	0.1	13.7	10.9	311	8.3	363
	5/22/00	1200	0.1	19.9	10.9	308	8.3	367
	6/19/00	1230	0.1	22.8	8.9	317	8.3	411
	7/24/00	1330	0.1	27.6	9.1	288	8.3	361
	8/21/00	1230	0.1	26.7	8.8	299	8.1	405
	9/18/00	1115	0.1	24.4	9.4	304	8	386
	10/23/00	1345	0.1	16.7	10.6	310	8.2	384
HD-3	4/24/00	0945	0.1	13.6	9.0	317	8.1	265
		0946	1	13.6	9.0	317	8.0	269
		0947	2	13.6	9.0	317	8.1	271
		0948	3	13.6	9.0	317	8.1	273
		0949	4	13.6	8.9	317	8.1	275
		0950	5	13.6	8.9	318	8.1	277
		0951	6	13.5	8.9	317	8.1	278
		0952	7	13.5	8.8	317	8.0	281
		0953	8	13.5	8.9	317	8.0	281
		0954	9	13.4	8.8	318	8.0	283
		0955	10	13.3	8.8	317	8.0	284
		0956	11	13.2	8.6	318	8.0	286
		0957	12	13.1	8.5	318	8.0	288
		0958	13	12.7	7.1	322	7.8	293
HD-3	5/22/00	0845	0.1	19.0	8.3	317	8.0	258
		0846	1	18.6	7.9	319	7.9	264
		0847	2	18.3	8.0	318	7.9	268
		0848	3	18.2	7.7	319	7.9	271
		0849	4	18.1	7.8	318	7.9	273
		0850	5	18.1	7.7	318	7.9	276
		0851	6	18.1	7.5	318	7.9	278
		0852	7	18.0	7.5	318	7.9	280
		0853	8	18.0	7.4	318	7.9	281
		0854	9	18.0	7.3	318	7.8	283
		0855	10	18.0	7.1	319	7.8	285
		0856	11	18.0	6.9	319	7.8	287
		0857	12	17.8	6.1	320	7.7	291
HD-3	6/19/00	0900	0.1	22.5	6.9	319	8.2	433
		0901	1	22.5	6.9	319	8.2	434
		0902	2	22.5	7.0	320	8.2	434
		0903	3	22.4	6.8	320	8.2	436
		0904	4	22.4	6.8	320	8.2	436
		0905	5	22.4	6.8	320	8.2	437
		0906	6	22.4	6.6	320	8.2	437
		0907	7	22.4	6.6	320	8.2	438

Station	Date mm/dd/yy	Time hhmm	Depth m	Temp °C	D.O. mg/L	Spec. Cond. u ohms	pH	Orp. mV
HD-3	6/19/00	0908	8	22.4	6.6	319	8.2	439
		0909	9	22.3	6.4	320	8.1	440
		0910	10	21.8	3.6	324	7.7	449
		0911	11	19.4	0.1	333	7.3	460
		0912	12	18.1	0.1	350	7.4	442
		0913	13	17.9	0.1	355	7.4	300
HD-3	7/24/00	1030	0.1	26.4	6.1	291	8.1	441
		1031	1	26.4	6.1	293	8.1	443
		1032	2	26.3	6.1	294	8.1	445
		1033	3	26.3	5.9	294	8.1	446
		1034	4	26.2	5.6	295	8.0	449
		1035	5	26.2	5.6	295	8.0	450
		1036	6	26.1	5.5	295	8.0	451
		1037	7	24.6	0.1	311	7.3	424
		1038	8	23.2	0.1	316	7.3	250
		1039	9	22.4	0.1	320	7.3	185
		1040	10	21.9	0.1	324	7.3	140
		1041	11	21.3	0.1	330	7.3	110
		1042	12	21.0	0.1	336	7.3	90
		1043	13	20.6	0.1	344	7.3	70
HD-3	8/21/00	0900	0.1	25.6	5.3	304	7.8	504
		0901	1	25.6	5.3	304	7.8	506
		0902	2	25.6	5.3	304	7.8	509
		0903	3	25.6	5.3	304	7.8	512
		0904	4	25.6	5.3	304	7.8	515
		0905	5	25.6	5.3	304	7.8	517
		0906	6	25.6	5.3	304	7.8	520
		0907	7	25.6	5.3	304	7.8	523
		0908	8	25.5	4.0	305	7.7	531
		0909	9	25.2	2.0	309	7.5	537
		0910	10	24.3	0.1	318	7.4	230
		0911	11	22.5	0.1	339	7.3	115
		0912	12	21.7	0.1	350	7.3	75
		0913	13	21.5	0.1	353	7.3	55
HD-3	9/18/00	0845	0.1	23.59	6.06	307	7.69	424
		0846	1	23.6	5.96	308	7.68	423
		0847	2	23.61	5.98	308	7.68	422
		0848	3	23.61	5.96	308	7.68	422
		0849	4	23.61	5.96	309	7.68	422
		0850	5	23.61	5.91	309	7.68	421
		0851	6	23.59	5.79	308	7.68	421
		0852	7	23.6	5.88	309	7.68	421
		0853	8	23.58	5.86	309	7.68	421
		0854	9	23.57	5.88	308	7.68	421

Station	Date mm/dd/yy	Time hhmm	Depth m	Temp °C	D.O. mg/L	Spec. Cond. u ohms	pH	Orp. mV
HD-3	9/18/00	0855	10	23.56	5.9	308	7.67	421
		0856	11	23.56	5.65	309	7.66	420
		0857	12	23.54	5.66	309	7.66	418
HD-3	10/23/00	0900	0.1	15.8	7.9	312	8.0	381
		0901	1	15.8	7.9	312	8.0	382
		0902	2	15.7	7.9	313	8.0	383
		0903	3	15.6	7.7	315	7.9	385
		0904	4	15.5	7.3	315	7.9	386
		0905	5	15.4	7.2	315	7.8	387
		0906	6	15.4	7.1	316	7.8	388
		0907	7	15.4	7.0	314	7.8	388
		0908	8	15.4	6.9	315	7.8	389
		0909	9	15.3	6.7	315	7.8	389
		0910	10	15.2	6.6	316	7.8	390
		0911	11	15.2	6.4	316	7.8	391
		0912	12	15.2	6.3	316	7.8	391
HD-6	4/24/00	1130	0.1	15.2	9.1	318	8.4	365
		1131	1	15.0	9.0	319	8.3	358
		1132	2	15.0	9.0	320	8.3	356
		1133	3	14.8	8.9	321	8.3	353
		1134	4	14.8	8.8	321	8.3	351
		1135	5	14.8	8.3	322	8.2	351
HD-6	5/22/00	1030	0.1	20.8	8.6	320	8.2	358
		1031	1	20.7	8.6	321	8.2	358
		1032	2	20.7	8.7	321	8.2	356
		1033	3	20.3	7.8	323	8.1	357
		1034	4	18.5	6.3	331	7.6	365
		1035	5	18.0	5.4	337	7.5	368
HD-6	6/19/00	1100	0.1	23.4	7.9	320	8.4	407
		1101	1	23.3	7.9	320	8.4	408
		1102	2	23.3	7.8	321	8.4	407
		1103	3	23.2	7.5	321	8.3	409
		1104	4	21.9	3.2	335	7.6	424
		1105	5	20.9	2.8	343	7.5	428
HD-6	7/24/00	1230	0.1	27.4	7.5	293	8.3	340
		1231	1	27.4	7.4	293	8.2	348
		1232	2	27.2	7.2	295	8.2	352
		1233	3	27.1	7.0	296	8.2	356
		1234	4	25.9	3.3	307	7.5	362
		1235	5	25.1	1.8	317	7.4	360

Station	Date mm/dd/yy	Time hhmm	Depth m	Temp °C	D.O. mg/L	Spec. Cond. u ohms	pH	Orp. mV
HD-6	8/21/00	1100	0.1	25.7	7.2	304	8.2	370
		1101	1	25.6	6.9	305	8.1	382
		1102	2	25.3	6.3	308	8.0	385
		1103	3	25.1	6.2	309	8.0	388
		1104	4	25.1	6.0	310	7.9	390
		1105	5	25.0	5.5	311	7.8	391
HD-6	9/18/00	1000	0.1	23.49	8.11	307	8.28	379
		1001	1	23.47	8.09	307	8.25	381
		1002	2	23.46	8.01	307	8.27	380
		1003	3	23.4	7.26	310	8.17	382
		1004	4	22.07	4.26	321	7.55	395
		1005	5	21.76	4.39	322	7.55	396
HD-6	10/23/00	1130	0.1	17.8	8.9	304	8.4	369
		1131	1	17.5	8.6	308	8.3	371
		1132	2	17.4	8.5	308	8.3	372
		1133	3	17.4	8.4	308	8.3	374
		1134	4	17.4	8.1	309	8.2	375
		1135	4.5	17.4	7.9	309	8.2	376
HD-11	4/24/00	1030	0.1	15.0	8.5	346	8.2	366
		1031	1	15.0	8.5	346	8.2	354
		1032	2	15.0	8.5	346	8.2	350
		1033	3	14.8	8.5	344	8.2	345
		1034	4	14.8	8.4	342	8.2	344
		1035	5	13.9	8.4	322	8.0	346
		1036	6	13.8	8.2	320	8.0	346
		1037	7	13.7	8.1	321	8.0	346
		1038	7.5	13.7	8.1	320	8.0	345
HD-11	5/22/00	0945	0.1	20.9	8.5	317	8.2	306
		0946	1	20.2	7.7	323	8.0	310
		0947	2	19.7	7.1	330	7.9	311
		0948	3	19.1	6.9	332	7.9	313
		0949	4	18.7	6.4	333	7.8	314
		0950	5	18.6	5.7	336	7.7	317
		0951	6	18.4	4.8	338	7.6	319
		0952	6.5	18.4	4.5	338	7.6	320
		1000	0.1	23.5	7.4	319	8.3	392
HD-11	6/19/00	1001	1	23.0	6.2	325	8.1	398
		1002	2	22.5	5.7	330	8.0	402
		1003	3	22.4	4.9	331	7.9	405
		1004	4	22.3	5.1	332	7.9	405
		1005	5	22.1	4.6	333	7.9	408
		1006	6	22.1	4.3	334	7.8	410

Station	Date mm/dd/yy	Time hhmm	Depth m	Temp °C	D.O. mg/L	Spec. Cond. u ohms	pH	Orp. mV
HD-11	6/19/00	1007	7	22.1	4.2	335	7.8	411
HD-11	7/24/00	1130	0.1	26.8	6.5	294	8.1	322
		1131	1	26.7	5.3	296	8.0	328
		1132	2	26.2	2.2	302	7.4	329
		1133	3	26.2	2.0	302	7.4	321
		1134	4	26.1	2.0	304	7.4	319
		1135	5	26.0	1.9	305	7.4	317
		1136	6	25.8	1.6	306	7.4	313
		1137	7	25.7	0.1	312	7.3	180
HD-11	8/21/00	1000	0.1	25.9	6.2	302	8.0	321
		1001	1	25.9	6.1	304	7.9	326
		1002	2	25.8	5.4	305	7.9	326
		1003	3	25.8	5.4	306	7.8	327
		1004	4	25.7	4.7	308	7.8	327
		1005	5	25.6	4.4	309	7.7	327
		1006	6	25.6	4.3	310	7.7	327
		1007	7	25.5	3.7	311	7.6	328
HD-11	9/18/00	0915	0.1	24.07	8.5	306	8.2	381
		0916	1	23.54	7.03	311	7.91	388
		0917	2	22.94	6.22	314	7.79	391
		0918	3	22.87	6.75	312	7.88	390
		0919	4	22.85	6.72	313	7.88	390
		0920	5	22.8	6.69	312	7.87	391
		0921	6	22.8	6.63	312	7.86	391
		1030	0.1	17.0	9.5	306	8.5	381
HD-11	10/23/00	1031	1	16.9	9.5	307	8.5	382
		1032	2	16.8	9.5	308	8.5	383
		1033	3	16.8	9.4	308	8.4	385
		1034	4	16.6	8.4	311	8.3	387
		1035	5	16.1	6	316	7.7	396
		1036	6	16.0	5.4	317	7.7	398

Table 3. 1999-2000 Hillsdale Lake Water Quality Data

STAT DET REP UNITS	DEPTH	DATE mmddyy	TIME hhmm	TKN mg/L	NH3 mg/L	NO3-N mg/L	NO2-N mg/L	TN mg/L	TP mg/L	DOP ug/L	ATZ NTU	TURB	TSS mg/L	SECC m	I% m	CHL ug/L
HD-3	0.1	04/20/99	0930	0.63	0.1	0.8	0.03	1.56	0.06	0.02	0.4	23	11	0.49	1.34	
	0.1	05/17/99	0930	0.54	<0.1	1.7	<0.02	2.24	0.07	0.03	1.8	23	8.9	0.58	1.22	5.8
	0.1	06/21/99	0900	0.42	<0.1	1.1	<0.02	1.52	0.03	<0.01	2.1	7.5	7.4	1.04	2.68	6.2
	0.1	07/19/99	0830	0.53	<0.1	0.6	<0.02	1.13	0.03	<0.01	1.9	4.6	5.5	1.34	2.74	9.8
	0.1	08/25/99	0930	0.36	<0.1	0.6	<0.02	0.96	0.02	<0.01	1.8	4.4	4	1.52	3.05	8.9
	0.1	09/20/99	0930	0.35	<0.1	<0.3	<0.02	0.35	0.04	0.01	1.9	11	8.8	0.76	1.83	1.6
HD-3	0.1	04/24/00	0945	0.5	<0.1	0.33	<0.02	0.83	0.05	0.01	1.32	17	4.9	0.76	1.65	1
	0.1	05/22/00	0845	0.22	<0.1	0.3	0.02	0.54	0.1	0.01	1.29	11	4.9	0.91	2.29	1.4
	0.1	06/19/00	0900	0.35	<0.1	0.18	<0.02	0.53	0.02	<0.01	1.44	5.3	2.9	1.52	3.26	3.3
	0.1	07/24/00	1030	0.5	<0.1	<0.02	<0.02	0.5	0.02	<0.01	lip	5.3	4.8	1.43	2.74	2.8
	0.1	08/21/00	0900	0.23	<0.1	<0.02	<0.02	0.23	0.03	<0.01	1.35	7.2	5.4	1.16	1.98	4.5
	0.1	09/18/00	0845	0.42	<0.1	<0.1	0.07	0.49	0.03	<0.01	1.18	10.8	9.2	0.88	1.55	7.8
	0.1	10/23/00	0900	0.28	<0.1	0.1	<0.02	0.38	0.03	0.01	1.23	8.7	8	0.91	2.74	4.5
HD-3	14	05/17/99	0944	0.45	<0.1	1.7	<0.02		0.09	0.03		30	14			
HD-3	13	04/24/00	0958	0.46	<0.1	0.33	<0.02		0.05	0.02	<0.05	21	8			
	13	09/18/00	0858	0.21	<0.1	<0.1	0.03		0.04	<0.01	1.3	13	11			
	12	10/23/00	0912	0.26	<0.1	0.1	0.03		0.03	0.01	1.29	15	8.5			
HD-6	0.1	04/20/99	1100	0.92	0.1	1.3	0.03	2.35	0.13	0.04	4.2	47	25	0.27	0.73	
	0.1	05/17/99	1145	0.59	<0.1	1.9	<0.02	2.49	0.12	0.04	2.4	42	26	0.3		4.7
	0.1	06/21/99	1030	0.55	<0.1	0.9	<0.02	1.45	0.05	<0.01	2	14	9	0.61	1.71	14.9
	0.1	07/19/99	1000	0.56	<0.1	0.5	<0.02	1.06	0.06	<0.01	1.9	14	16	0.61	1.37	34.6
	0.1	08/25/99	1130	0.42	<0.1	0.4	<0.02	0.82	0.07	0.01	2	18	18	0.49	1.16	11.6
	0.1	09/20/99	1130	0.39	<0.1	<0.3	<0.02	0.39	0.06	0.01	1.6	20	21	0.46	1.07	14.3
HD-6	0.1	04/24/00	1130	0.78	<0.1	0.16	<0.02	0.94	0.09	0.01	<0.05	28	27	0.37	0.67	16
	0.1	05/22/00	1030	0.32	<0.1	0.19	0.02	0.53	0.12	0.01	1.18	17	14	0.61	1.58	7.8
	0.1	06/19/00	1100	0.49	<0.1	0.08	<0.02	0.57	0.04	<0.01	1.82	15	12	0.61	1.52	6.5
	0.1	07/24/00	1230	0.53	<0.1	<0.02	<0.02	0.53	0.06	<0.01	1.4	12	9.8	0.76	1.52	1.4
	0.1	08/21/00	1100	0.45	<0.1	<0.02	<0.02	0.45	0.07	<0.01	1.19	21	21	0.46	1.22	5.4
	0.1	09/18/00	1000	0.34	<0.1	<0.1	<0.02	0.34	0.05	<0.01	1.43	15	16	0.61	1.52	4.5
	0.1	10/23/00	1130	0.28	<0.1	<0.1	<0.02	0.28	0.06	0.01	1.14	16	17	0.55	1.28	13.6

STAT DET REP UNITS	DEPTH	DATE	TIME	TKN	NH3	NO3-N	NO2-N	TN	TP	DOP	ATZ	TURB	TSS	SECC	I%	CHL
	m	mmddyy	hhmm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	ug/L	NTU	mg/L	m	m	ug/L	
HD-6	6	05/17/99	1151	0.54	<0.1	1.8	<0.02		0.12	0.04		43	23			
HD-6	5	04/24/00	1135	0.77	<0.1	0.16	<0.02		0.11	0.01	<0.05	37	41			
	5	09/18/00	1005	0.59	<0.1	<0.1	<0.02		0.08	<0.01	1.14	54	65			
	4.5	10/23/00	1135	0.42	<0.1	<0.1	<0.02		0.08	0.01	1.2	29	32			
HD-11	0.1	04/20/99	1030	0.63	0.1	0.8	0.02	1.55	0.07	0.02	0.5	26	15	0.46	1.22	
	0.1	05/17/99	1045	0.58	<0.1	1.7	0.02	2.3	0.09	0.04	1.3	29	11	0.4	2.5	
	0.1	06/21/99	0945	0.61	<0.1	0.9	<0.02	1.51	0.04	<0.01	2.3	9.5	16	0.82	1.74	
	0.1	07/19/99	0915	0.49	<0.1	0.5	<0.02	0.99	0.03	<0.01	2.2	5.9	6.3	0.96	2.07	
	0.1	08/25/99	1030	0.3	<0.1	0.4	<0.02	0.7	0.05	<0.01	1.9	8.6	7.2	0.82	1.6	
	0.1	09/20/99	1030	0.47	<0.1	<0.3	<0.02	0.47	0.05	<0.01	1.8	14	15	0.61	1.25	
HD-11	0.1	04/24/00	1030	0.67	<0.1	0.1	<0.02	0.77	0.09	0.01	1.2	23	22	0.49	0.91	
	0.1	05/22/00	0945	0.37	<0.1	0.26	0.02	0.65	0.1	0.01	1.27	13	7.2	0.82	1.83	
	0.1	06/19/00	1000	0.42	<0.1	0.13	<0.02	0.55	0.03	<0.01	1.46	10	8	0.85	1.52	
	0.1	07/24/00	1130	0.35	<0.1	<0.02	<0.02	0.35	0.03	<0.01	1.32	5.8	6.9	1.22	2.29	
	0.1	08/21/00	1000	0.28	<0.1	<0.02	<0.02	0.28	0.04	<0.01	1.33	8.8	8.4	0.88	1.83	
	0.1	09/18/00	0915	0.23	<0.1	<0.1	<0.02	0.23	0.03	<0.01	1.37	7.1	8.2	0.76	1.52	
	0.1	10/23/00	1030	0.38	<0.1	<0.1	<0.02	0.38	0.04	0.01	1.17	11	9.7	0.79	2.62	
HD-11	9	05/17/99	1054	0.53	<0.1	1.7	0.02		0.12	0.04		44	28			
HD-11	7.5	04/24/00	1038	0.57	<0.1	0.29	<0.02		0.06	0.01	lip	22	13			
	6.5	09/18/00	0922	0.43	<0.1	<0.1	<0.02		0.18	<0.01	1.37	26.4	27.6			
	6	10/23/00	1036	0.46	<0.1	<0.1	<0.02		0.06	0.01	1.28	28	28			